

$$6'1" = 6 \times 12 + 1 = 73"$$

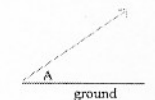
$$\tan 28^\circ = 73/x \quad x = 137.293 \text{ inches}$$

$$x =$$

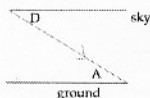
Obj: Students will be able to find the measure of an angle using inverse trig relationships.

**Ticket in:**

Santiago is 6'1" tall.  
Find the length of his shadow if the angle of elevation the sun is  $28^\circ$ .  
(in feet)



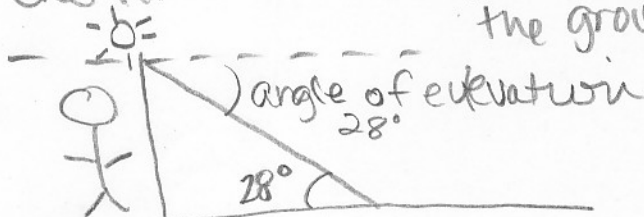
An Angle of Elevation A



An Angle of Depression D  
Then  $D = A$

Slide #1

make sure that students understand that the sun is on the horizontal so  $28^\circ$  is on the ground!



Obj: Students will be able to find the measure of an angle using inverse trig relationships.

Well, we have been using trig to find the measures of the sides of triangles.

We have been finding the values of trig functions. What is next?

What if we need to find out the angle measurement?  
(6)

11,441 feet

Obj: Students will be able to find the measure of an angle using inverse trig relationships.



$$\sqrt{x} = 4$$

$$\sqrt{\quad} \quad \sqrt{\quad}$$

$$x = \frac{4}{\sqrt{\quad}}$$

To prove a point, Mrs. Bashford solved the following equation for her students.

What point is she trying to make?

Obj: Students will be able to find the measure of an angle using inverse trig relationships.



$$\frac{\log_2 X}{\log_2} = \frac{3}{\log_2}$$

$$X = \frac{3}{\log_2}$$

Why or why not?

\* Trying to help kids understand that you must apply the inverse operation. Just because two things are next to each other that doesn't mean they are being multiplied.   
 ^ always

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Mrs. E1 is brilli

Why, thank you, Mrs. Evans! ☐

In order to "solve" an equation, you must perform the INVERSE operation to "undo" the equation.

Mrs. Evans has a big head.

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Inverses UNDO! ☐

Addition will "undo" Sub

Division will "undo" mult

Squaring will "undo"  $\sqrt{\quad}$

To "undo" an exponential equation, you must log or ln both sides.

To "undo" a logarithmic equation, you must e both sides.

(raise to a power of e)

Click on Square inside the thought bubble! Sound!

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

$\sqrt{x} = 4$

Think inverses!!!!

$(\sqrt{x})^2 = (4)^2$

$x = 16$

Inverses UNDO! ☐

Is it possible to "undo" Mr. Biller's CrAZY gene?

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Okay, so what?

Don't you know anything, Mr. Biller?

And, your floating head is making me nervous.

Inverses can be applied to TRIG functions!

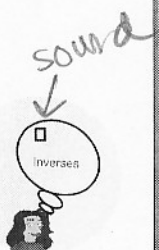
Ms. Shaw when she straightens her curly locks

invisible square below Billers neck has sound!

Obj: Students will be able to find the measure of an angle using inverse trig relationships.

Solving trigonometric functions is like solving equations!

Solve:  $\frac{3}{4}x - 10 = 20$



Handwritten work for the equation  $\frac{3}{4}x - 10 = 20$ :

$$\frac{3}{4}x - 10 = 20$$

$$\frac{3}{4}x = 30 \left(\frac{4}{3}\right)$$

$$x = 40$$

Obj: Students will be able to find the measure of an angle using inverse trig relationships.

Think about it!

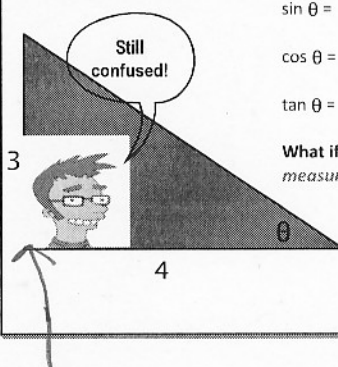
As of right now, you can find the values of the 6 trig functions...

$\sin \theta =$        $\csc \theta =$

$\cos \theta =$        $\sec \theta =$

$\tan \theta =$        $\cot \theta =$

What if you needed to know the measure of the angle?

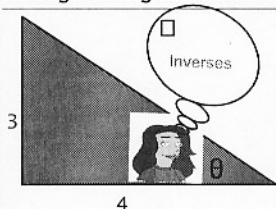


Handwritten work for the triangle:

Sound at corner!

$\sin \theta = 3/5$	$\csc \theta = 5/3$
$\cos \theta = 4/5$	$\sec \theta = 5/4$
$\tan \theta = 3/4$	$\cot \theta = 4/3$

Obj: Students will be able to find the measure of an angle using inverse trig relationships.



Hint --->  
Look on your calculator

Notation:

Inverse  $\sin \theta \rightarrow$   
 $\sin^{-1}(\sin \theta)$  OR  
 $\arcsin(\sin \theta)$

Obj: Students will be able to find the measure of an angle using inverse trig relationships.

Still confused!

If  $\sin \theta = 3/5$  and we want to know what  $\theta$  equals...

Perform the inverse operation:

$\sin^{-1}(\sin \theta) = \sin^{-1}(3/5)$

Try it on your calculator!

Handwritten calculator work:

$\sin \theta = 3/5$

$\sin^{-1}(3/5)$

$\sin^{-1} \left[ \frac{3}{5} \right] = 0.644$



New Notation!

$\sin^{-1} \theta = \arcsin \theta$

If students are in Degree Mode they will get it WRONG!

See next slide!

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Why did I get it wrong?

Are you in RADIANS?

\* Radians is default!  
 only use degrees if  
 the problem calls  
 for it!  
 this one did  
 NOT!

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Would I always have to use sine?

Why don't you TRY something... THINK for once, Mr. Biller.

$\tan \theta = \frac{3}{4}$   
Find  $\theta$ !

0.644

Whether you use  
 $\sin \theta$ ,  $\tan \theta$  or  
 $\cos \theta$   
 $\theta$  will be the  
 same!

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Why does everyone always pick on me?

Because you look like Millhouse.

$\cos \theta = \frac{3}{4}$   
Find  $\theta$ !

0.644

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

Stop calling me wEiRd!

Isn't that weird?

$\sin \theta = \frac{3}{4}$   
Find  $\theta$ !

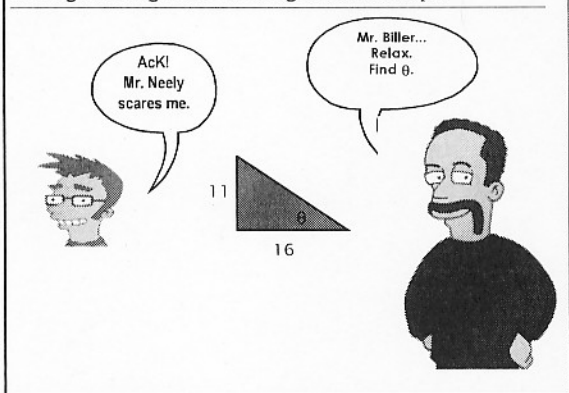
0.644

Why are all of the answers the same?

the  $\theta$  doesn't change!

the trig functions are  
 using changes in sines  
 the ratio you use

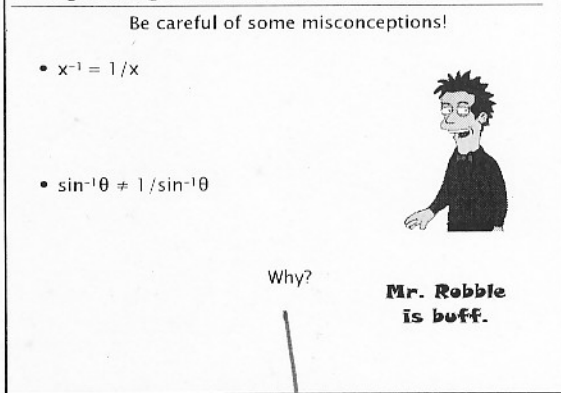
**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**



0.602  
 $\tan \theta = \frac{11}{16}$

$\tan^{-1}(\tan \theta) = \tan^{-1}(\frac{11}{16})$

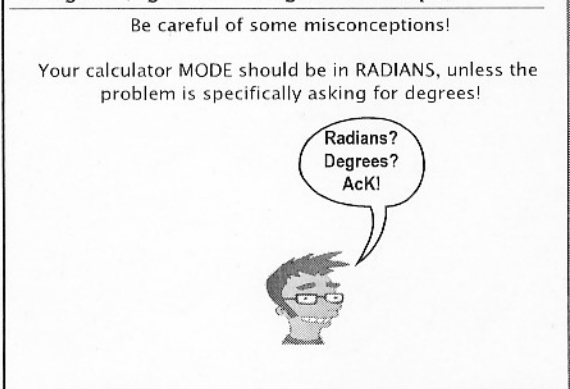
**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**



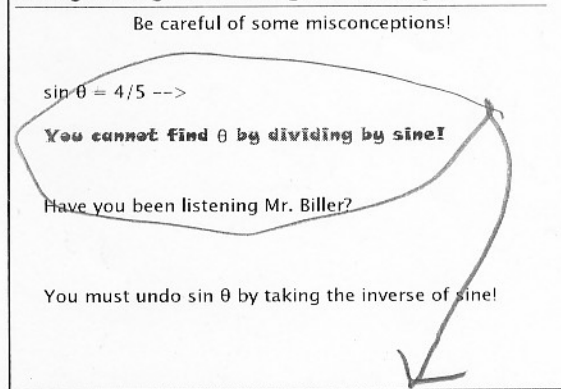
The inverse of  $x$  is  $1/x$

the inverse of  $\sin \theta = \sin^{-1} \theta$ !

**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**



**Obj: Students will be able to find the measure of an angle using inverse trig relationships.**

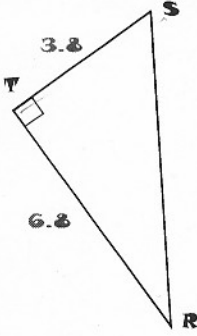


this happens  
A LOT

# DEGREES

HW:  
P. 833-834  
(32-43 all, 46-49 all)

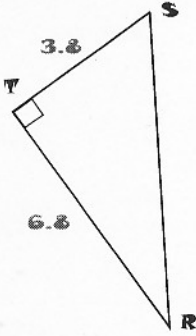
**Obj:** Students will be able to find the measure of an angle using inverse trig relationships.



To SOLVE a triangle, you will need to find the measures of all the unknown sides and angles.

- 1 Find the measure of angle R (in degrees)

**Obj:** Students will be able to find the measure of an angle using inverse trig relationships.



To SOLVE a triangle, you will need to find the measures of all the unknown sides and angles.

- 2 Find the measure of angle S (in degrees)

$$\tan R = \frac{3.8}{6.8}$$

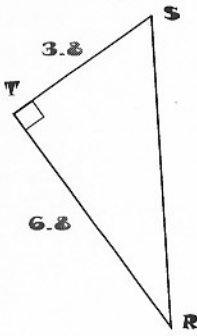
$$R = \tan^{-1}(3.8/6.8)$$

$$\angle R = 29.197^\circ$$

$$90 + 29.197 + x = 180$$

$$\angle S = 60.803^\circ$$

**Obj:** Students will be able to find the measure of an angle using inverse trig relationships.



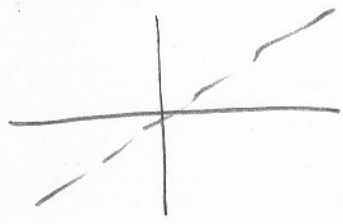
To SOLVE a triangle, you will need to find the measures of all the unknown sides and angles.

- 3 Find the length of RS.

**Obj:** Students will be able to find the measure of an angle using inverse trig relationships.

Use your graphing calculator to graph  $y = \sin x$  and  $y = \sin^{-1} x$

What do you notice?



$$3.8^2 + 6.8^2 = (RS)^2$$

reflection about  
 $y = x$   
all inverse are  
a reflection  
about  $y = x$